

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1 - 74. (Cancelled)

75. (New) A nucleotide vaccine composition comprising a mixture of:

nucleotide sequence encoding an antigen and provided in a vector, the nucleotide sequence under transcriptional control of a promoter, wherein said vector comprises an unmethylated cytidine phosphate guanosine (CpG) sequence and is selected from at least one of virus vector, non-viral vector, plasmid, microbe-derived vector, liposome and small molecule carrier; and

antigen-presenting cells in the form of dendritic cells expressing Toll-like receptor 9 and modified to express one of CD40 ligand and GM-CSF, the CD40 ligand and GM-CSF encoded by a nucleotide sequence engineered into said antigen-presenting cells.

76. (New) The vaccine composition according to claim 75, wherein said vaccine composition is provided as pre-incubated mixture of said nucleotide sequence and said modified antigen-presenting cells.

77. (New) The vaccine composition according to claim 75, wherein said antigen-presenting cells are professional antigen-presenting cells.

78. (New) The vaccine composition according to claim 75, wherein said antigen-presenting cells are plasmacytoid dendritic cells.

79. (New) The vaccine composition according to claim 75, wherein said antigen-presenting cells are human equivalents to a subclass of dendritic cells that express CD8 α , B220, CD11C and B7 molecules in mice.

80. (New) The vaccine composition according to claim 75, wherein said antigen-presenting cells express P2 receptor.

81. (New) The vaccine composition according to claim 75, wherein said antigen-presenting cells can be induced to produce type I interferon-alpha and/or interferon-beta.

82. (New) The vaccine composition according to claim 75, wherein said antigen-presenting cells are modified to express said CD40 ligand.

83. (New) The vaccine composition according to claim 75, wherein said antigen comprises the ela2 fusion peptide defined as the amino acid sequence of SEQ ID NO: 5.

84. (New) A nucleotide vaccine composition comprising a mixture of:

nucleotide sequence encoding an antigen, wherein said nucleotide sequence comprises a nucleotide sequence of the mini-ela2 fusion gene of SEQ ID NO: 3; and

antigen-presenting cells modified to express at least one immune response modulating molecule selected from CD40 ligand and GM-CSF.

85. (New) A nucleotide vaccine composition comprising a mixture of:

nucleotide sequence encoding an antigen, wherein said nucleotide sequence comprises a nucleotide sequence encoding the mini-ela2 fusion protein of SEQ ID NO: 4; and

antigen-presenting cells modified to express at least one immune response modulating molecule selected from CD40 ligand and GM-CSF.

86. (New) A method of producing a vaccine composition comprising the steps of:

providing nucleotide sequence encoding an antigen and provided in a vector, the nucleotide sequence under transcriptional control of a promoter, wherein said vector comprises an unmethylated cytidine phosphate guanosine (CpG) sequence and is selected from at least one of virus vector, non-viral vector, plasmid, microbe-derived vector, liposome and small molecule carrier;

providing antigen-presenting cells in the form of dendritic cells expressing Toll-like receptor 9 and modified to express one of CD40 ligand and GM-CSF, the CD40 ligand and GM-CSF encoded by a nucleotide sequence engineered into said antigen-presenting cells; and

mixing said nucleotide sequence encoding said antigen and said modified antigen-presenting cells.

87. (New) The method according to claim 86, further comprising the step of pre-incubating said nucleotide sequence encoding said antigen with said modified antigen-presenting cells for enhancing their binding and interaction.

88. (New) The method according to claim 86, wherein said nucleotide sequence providing step comprises the steps of:

providing a MHC-binding antigenic protein or peptide;
cloning a nucleotide sequence encoding said MHC-binding antigenic protein or peptide into said vector; and

propagating said vector in a propagation system.

89. (New) The method according to claim 86, wherein said providing antigen-presenting cells step comprises the steps of:

isolating said antigen presenting cells from a subject;
and

engineering said antigen-presenting cells to express one of CD40 ligand and GM-CSF.

90. (New) A method of producing an immune response in a subject comprising the step of administering the nucleotide vaccine composition according to claim 75 to said subject.